Disengage: an Architectural Deepfake

An Honors Thesis (ARCH 402)

By

Noah Gaither

Thesis Advisor

James Kerestes

Ball State University
Muncie, Indiana

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Abstract

As a representational technique, deepfakes allow for the distilling of basic characteristics that define their constituent parts. Contemporary technologies typically apply this by superimposing an actor's face onto the body of another, resulting in a wholly original character by combining the defining traits of both actors. I apply this concept to architectural design by analyzing two precedent houses, Peter Eisenman's *House III* (1971) and KieranTimberlake's *Loblolly House* (2006), extracting their defining characteristics, and creating an architectural deepfake that would become the design for a speculative suburban house for a collector of books.

Acknowledgments

I would like to thank Professor James Kerestes for advising me through this project. His encouragement and architectural advice allowed me to continue to develop my design in increasingly wholistic ways.

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Process Analysis Statement

Precedent Analysis

The first step of the project was to select two precedent houses that would serve as the subjects for basing the architectural deepfake. It was important that the deepfake be based in precedent houses that were familiar and thoughtfully-crafted so that the result had a measurement of success—that is, how clearly my final design is a deepfake of the original two buildings. The two precedents I selected were Peter Eisenman's *House III* (1971) and KieranTimberlake's *Loblolly House* (2006). As the process of distilling and extracting the architectural language of the houses would largely come down to observing their forms, I selected two houses that had very different appearances but utilized similar elements.

Figure 1: Peter Eisenman's *House III* (left) and KieranTimberlake's *Loblolly House* (right)
Image Sources: eisenmanarchitects.com, kierantimberlake.com

I extracted the defining architectural characteristics of each house and distilled them into an analytical drawing. These drawings, rather the architectural language they convey, would serve as the two inputs for the deepfake. The drawing for *House III* communicates and "inside versus outside" relationship, relative to the form of the building, whereas the drawing for *Loblolly House* shows "part to part" and "part to whole" relationships in the way that the building was modularly constructed.

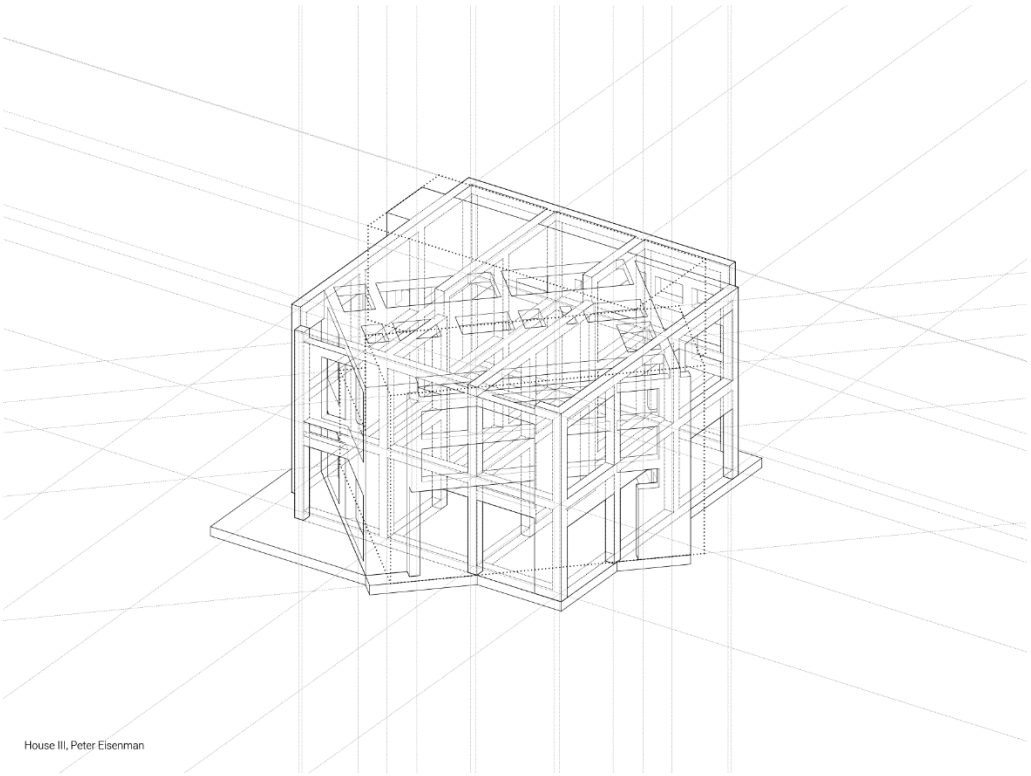

Figure 2: *House III* analytical drawing

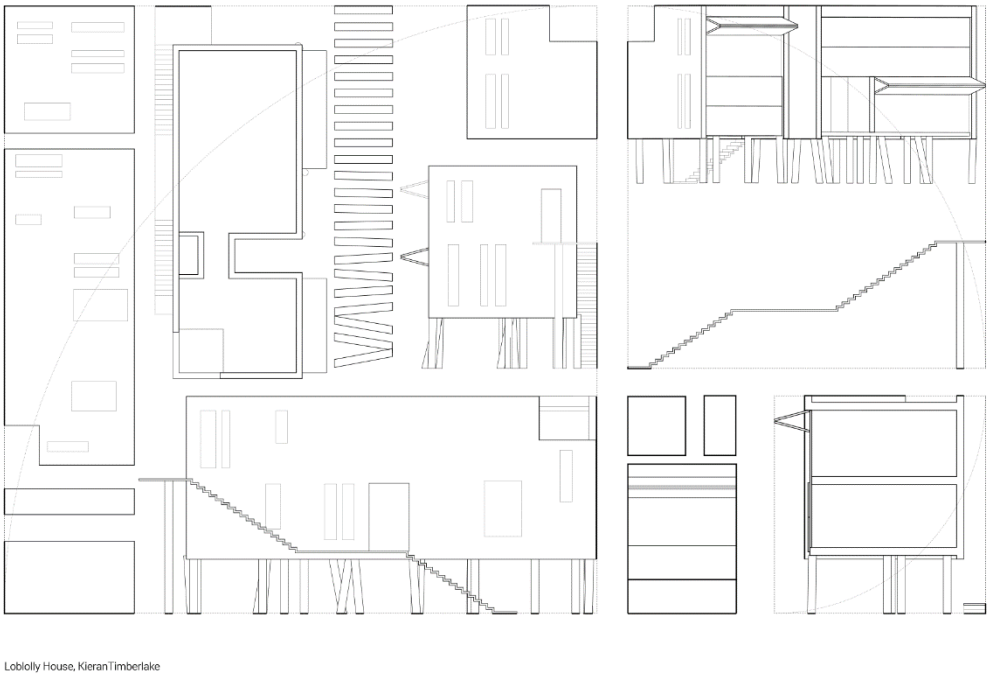

Figure 3: *Loblolly House* analytical drawing

2D Deepfake Studies

The languages extracted from the precedent studies were used to create a hybrid analytical drawing that would show how a deepfake of those defining characteristics might look. To create this, I imposed the “part to part” and “part to whole” language upon the geometry of *House III* by exploding it into segments that are defined by the result of Eisenman’s formal exploration, not the procedure. For example, a segment would not be a whole wall or a whole floor, but perhaps a piece that consisted of both wall and floor planes. These segments then intersect with sectional chunks of the *Loblolly House*, applying the “inside versus outside” relationship.

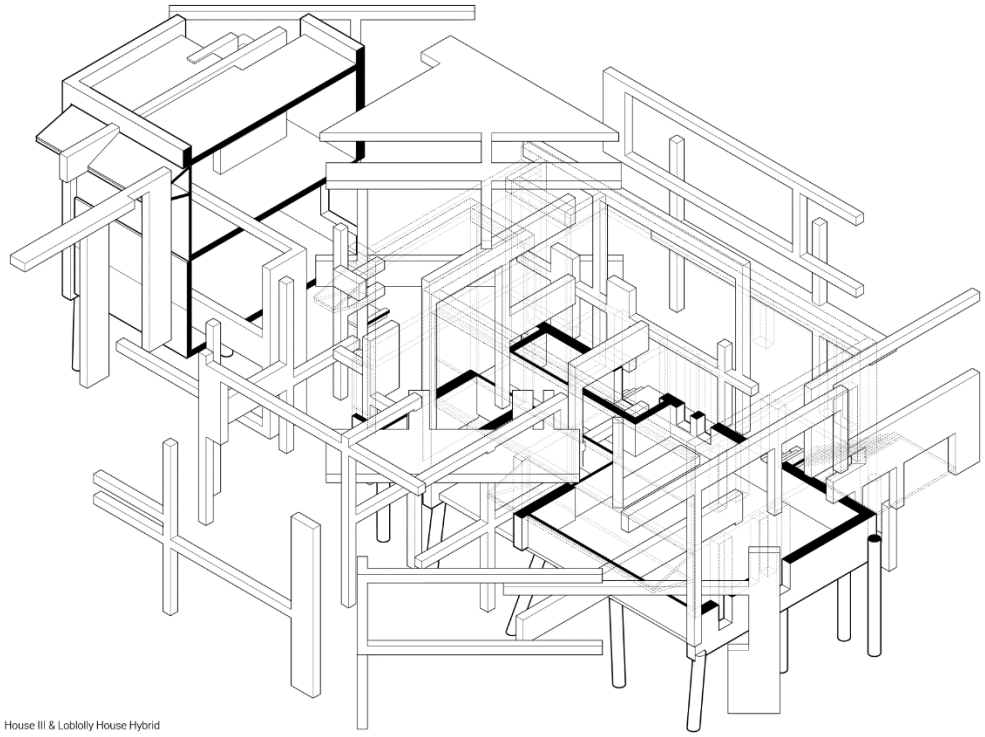

Figure 4: Hybrid analytical drawing

To further explore a two-dimensional deepfake of the precedent houses, I produced a series of photo deepfakes using the web service Dreamscope App. I input a photo of Precedent A and allow another photo of Precedent B to act as an image filter. The result would be a photo deepfake that applies a likeness of Precedent B onto the photo of

Precedent A. Since the first photo acts as a base for the deepfake, the order in which they are applied influences the outcome. After producing two sets in which Precedent A was the base and Precedent B was the base, I selected the photos that best aligned with my previous hybrid analytical composition and used those as a base, applying images of Precedent A or Precedent B as image filters. Lastly, I selected the most promising of those images and applied an image threshold. The threshold images show characteristics of the *House III* and *Loblolly House* deepfake, becoming instigators for further design inquiry.

Figure 5: Photo deepfakes (left) and their corresponding threshold images (right)

3D Deepfake Studies

The geometry used to create the hybrid analytical drawing became the basis for what would be three-dimensional deepfake studies. For each of the compositions, it was important that they show a range of difference in areas such as varying thickness of elements, distance between elements, and areas of density or dispersion. I produced thirty iterations of 3D compositions and selected the most promising one to develop further.

Figure 6: 3D compositions (selected iteration shown in red)

For this chosen iteration, I produced a scaled-down physical model made of laser-cut birch wood and hardboard. Physically constructing the composition showed instances were elements would have to shift from their original position or be put together in a

certain way, as they would have to if it was to be constructed in real life. The physical model also allowed me to look at the composition from difference angles and make decisions based on what parts are perhaps redundant and how the model should sit on a site.

Design Development

I used the 3D composition to make thirty more iterations of how the model could sit on a site at the scale of a house. These iterations mostly consisted of rotations and reflections about the X, Y, and Z axes instead of the previous studies where the geometry was altered in significant ways. The iteration that was chosen utilized the composition flipped on its side and intersecting with the floor plane of the site. The elements below the floor plane were trimmed, flipped 180 degrees, and placed above the floor plane. The result was a composition with both density and dispersion as well as the beginnings of spatial denotation.

After introducing horizontal surfaces for the 2nd and 3rd floors, I constructed another scaled-down physical model made of laser-cut white acrylic. Because the model was larger and the building material was thicker, the process of constructing it showed me what areas may be weak or need further structural support in the working building. The immateriality of the physical model was conducive for observing a variety of moments created by the junction of elements which would become emphasized in the final composition.

These moments became opportunities to introduce curatorial logic for the way the books would be displayed in the house. I designed four instances in which the scale of the books would allow the once unmoved geometry of the house to mutate in a way that fit the collection. The first instance is an alternating forward-facing and top-facing set of shelves utilizing the form of a horizontal element joined to one of the character-defining elements. The second instance is a diagonal shelf created by cutting into one of the character-defining elements. The third instance is less structured, with book-shaped holes being introduced into the building geometry. The fourth instance utilizes perforations in the building geometry as housing for a series of books.

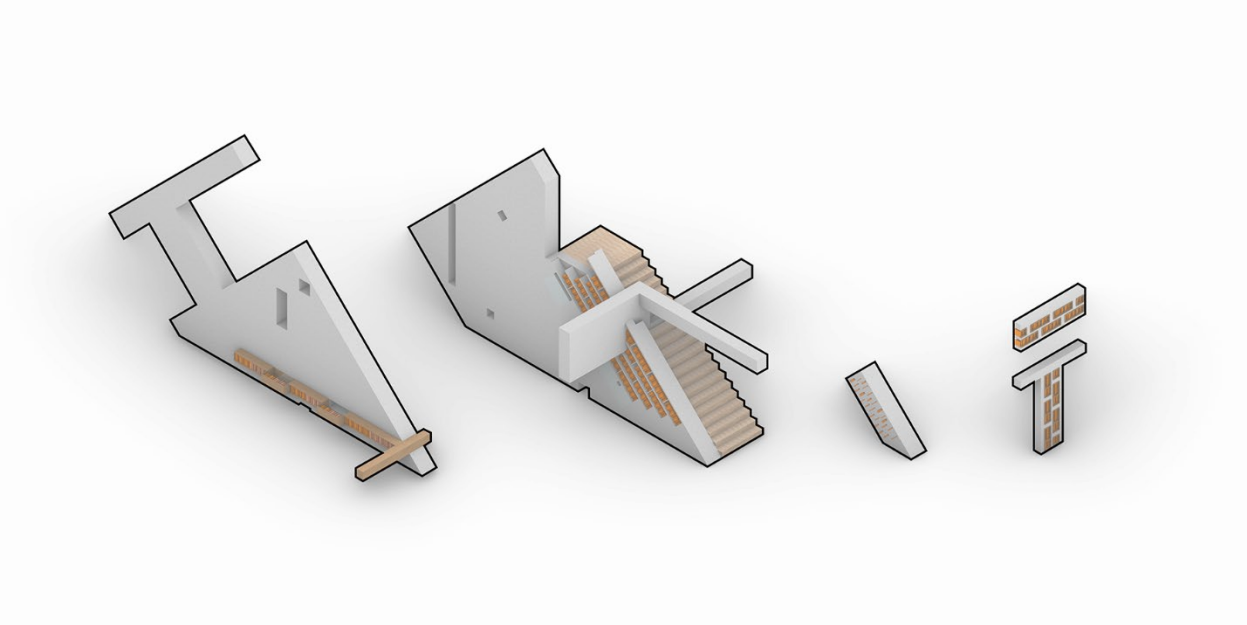

Figure 7: Curatorial logic moments

Taking inspiration from Andrew Zago's drawing of Thom Mayne's *Sixth Street House* (1987), I produced an interior analytical drawing of my design by extruding important, character-defining elements of my composition and having their shadows cast onto a floor plan. This drawing communicates the directional relationship of the character-defining elements of my composition as well as showing the 45-degree angle pitch on some elements that is not evident from the plan drawing yet is still an influencer of design decisions throughout the project.

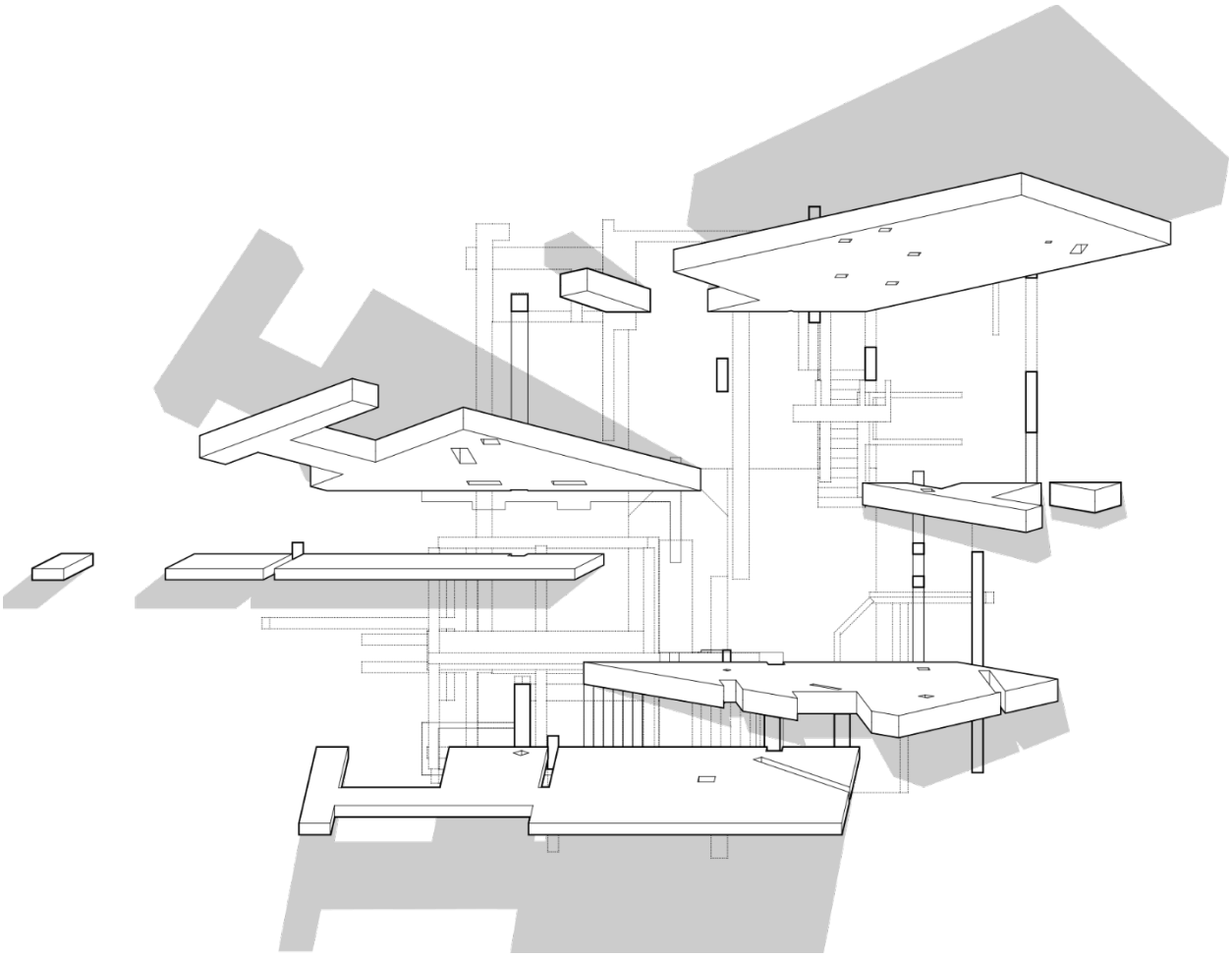

Figure 8: Interior analytical drawing

As the building developed, I allowed the form of the site and the composition to interplay. To keep with the language of the building, elements were dispersed throughout the site following the structure of the perforations in the character-defining elements from the interior analytical drawing. The site returned its influence upon the building by allowing the lawn to run up the exterior and become a greenwall and greenroof. The 45-degree angle showed in the method for arranging program on the site, such as the koi pond, the lawn, barrier walls, and vegetation.

Final Design

I produced a series of drawings in plan, elevation, and section to showcase the final design of the deepfake home for a book collector. Dimensioning and a sectional chunk were added for a viewer to understand how the building could realistically be constructed. To show the scale of the home and materiality, I produced two photo-realistic renderings taken from site.

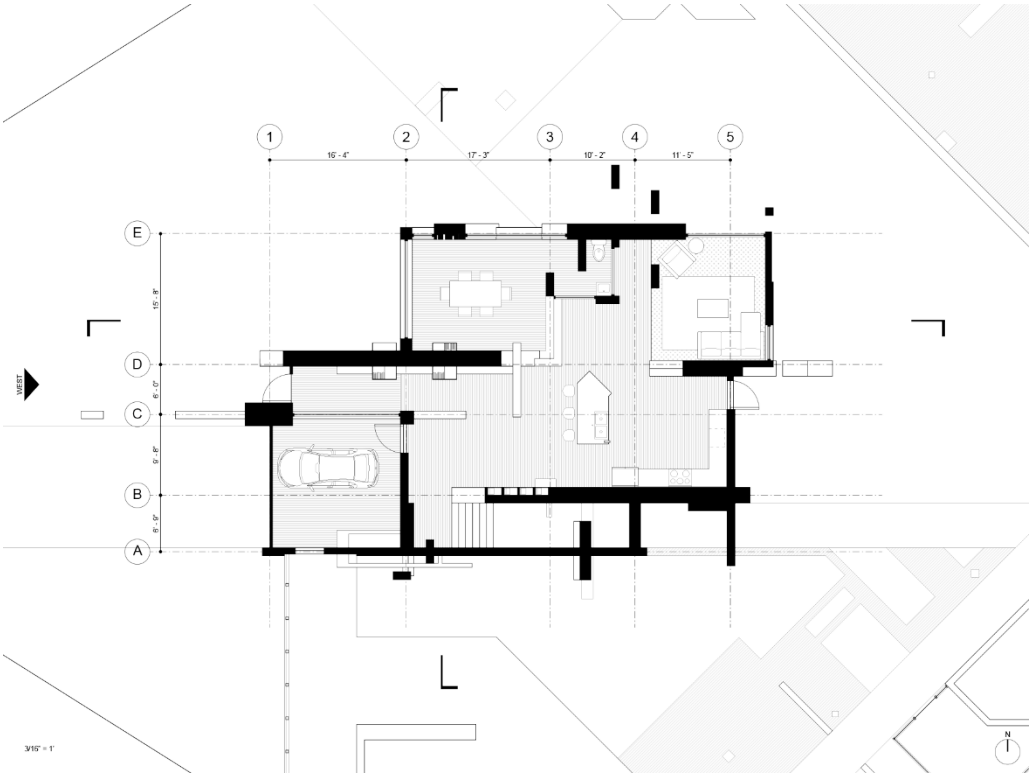

Figure 9: 1st floor plan

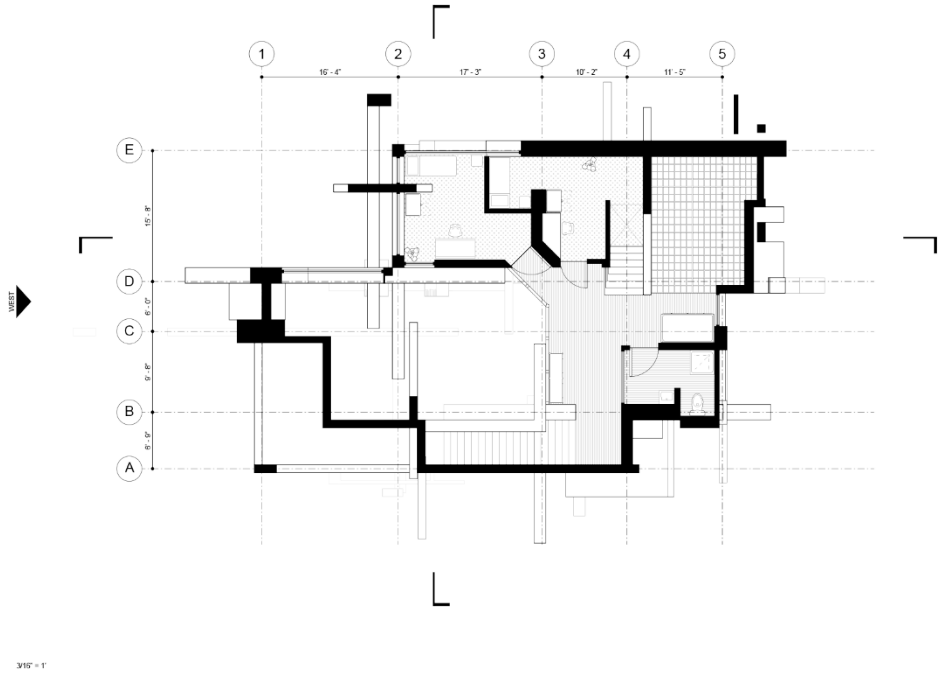

Figure 10: 2nd floor plan

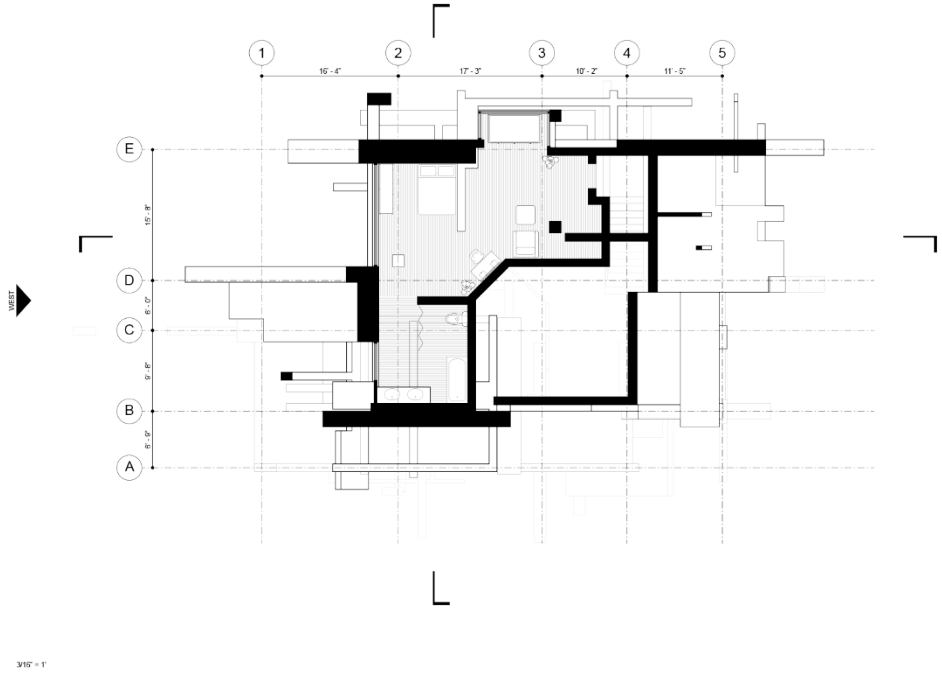

Figure 11: 3rd floor plan

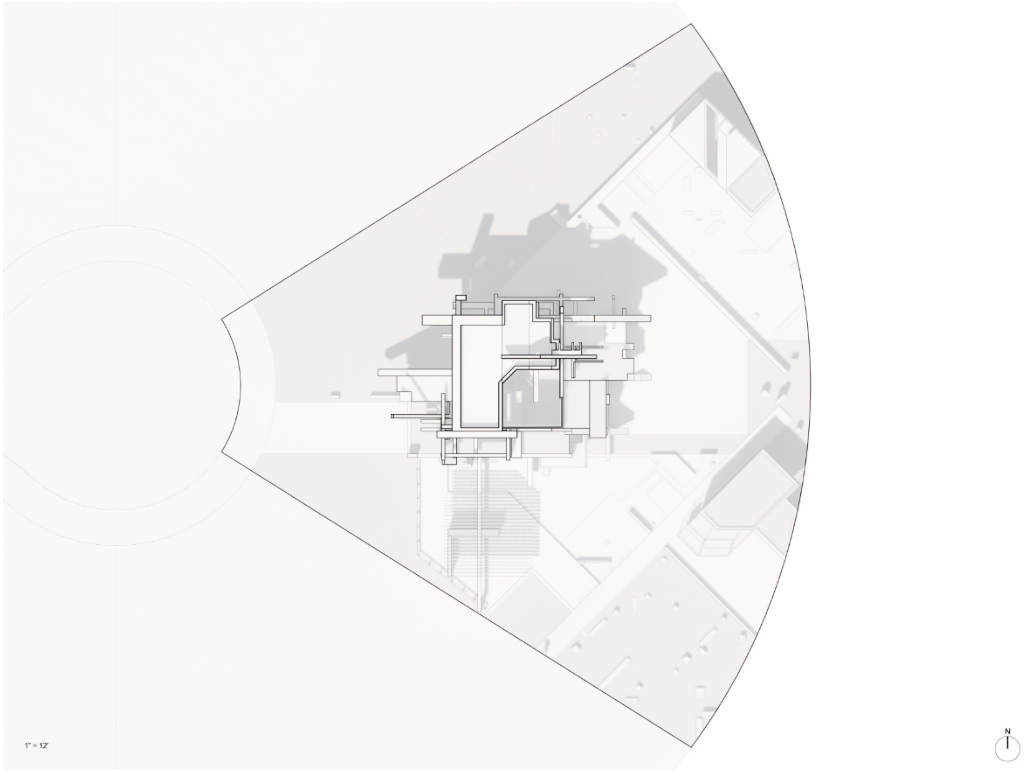

Figure 12: Site plan

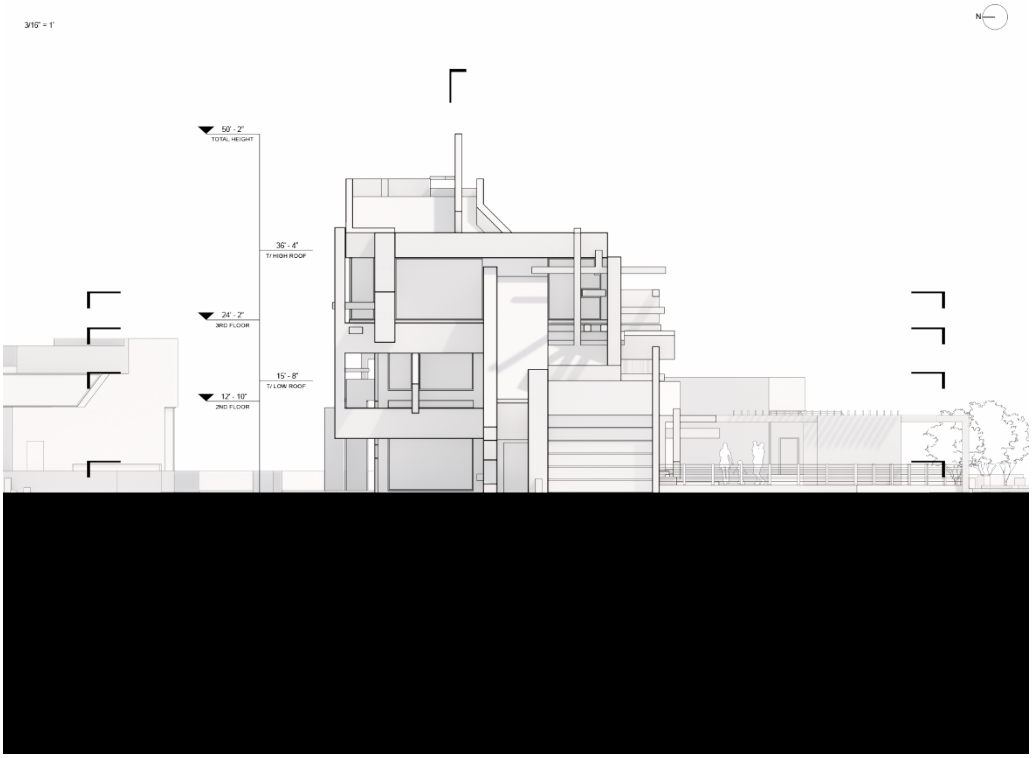

Figure 13: West Elevation

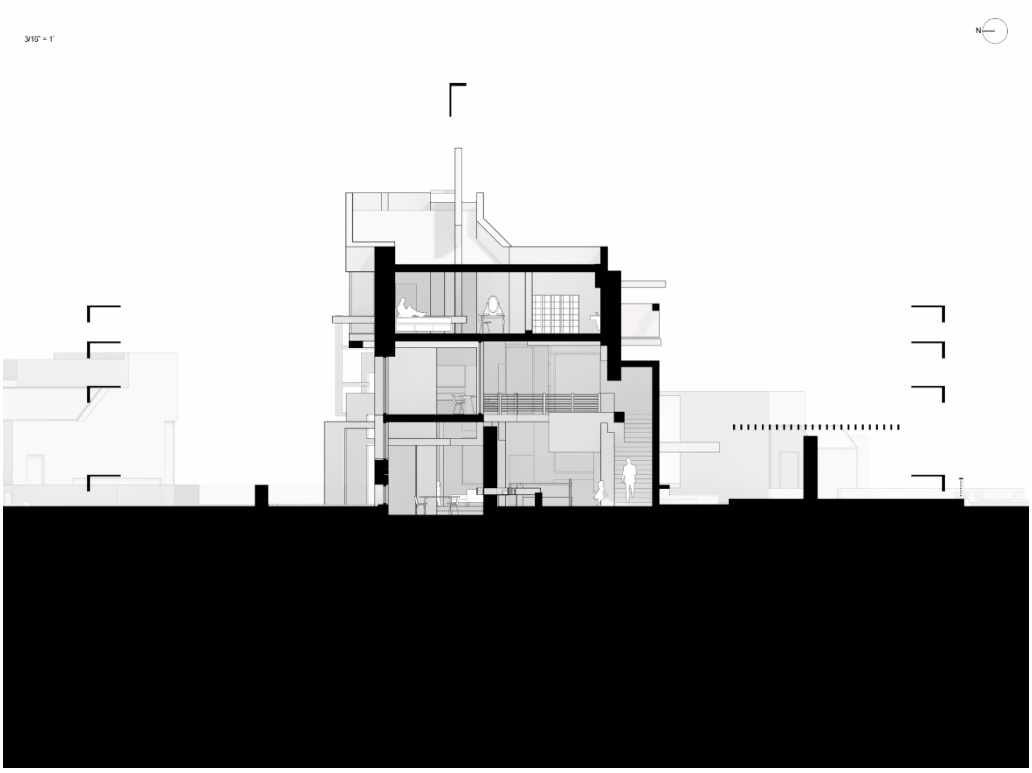

Figure 14: Cross section

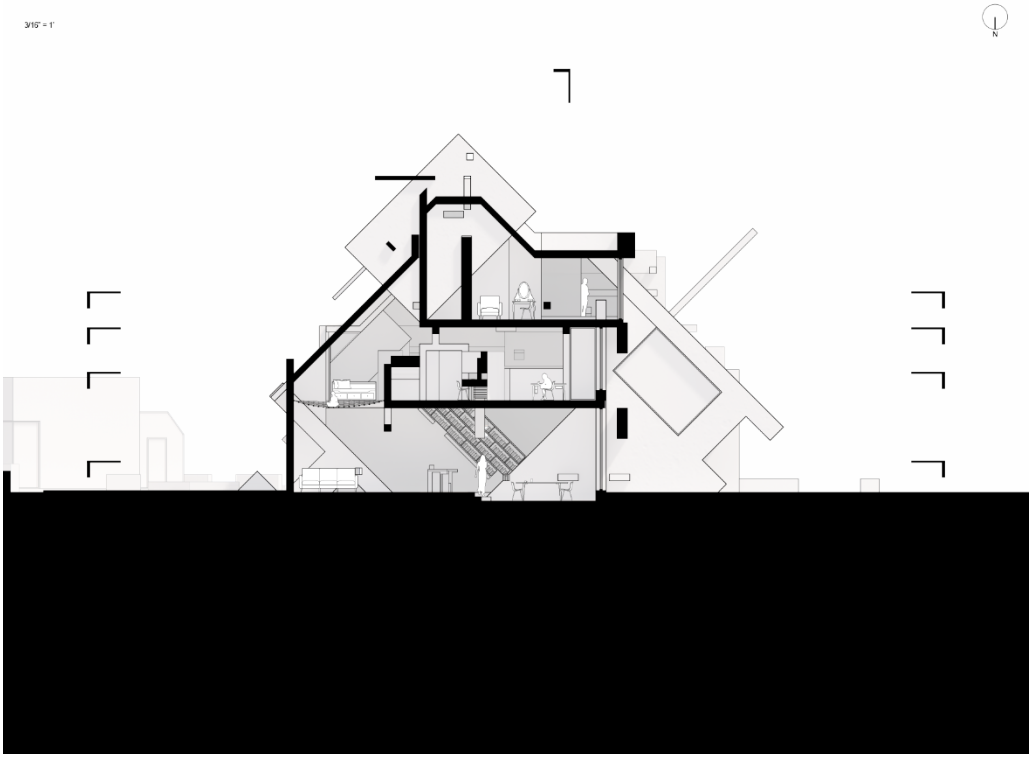

Figure 15: Long section

Figure 16: Exterior rendering (from South East corner)

Figure 17: Exterior rendering (from North East corner)

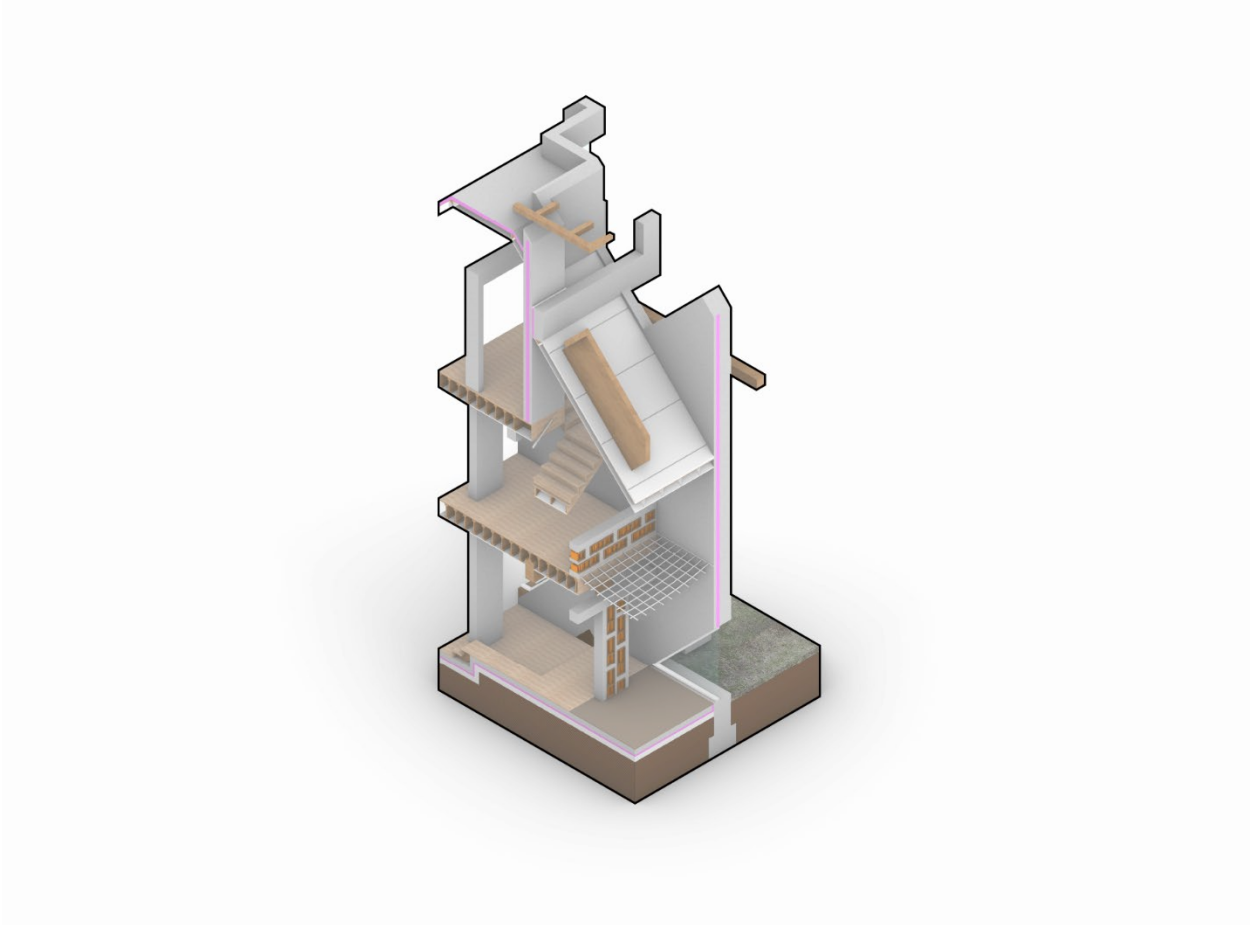

Figure 18: Tectonic chunk model

Conclusion

Photo and video deepfakes are becoming more viral in online media but only as a short-lived gag, tricking viewers with superimposing one actor's face on another actor's body. With my thesis, I had hoped to illustrate that a deepfake opens enriching conversations not only about the convergence of its source material, but also the inherent, defining qualities of those source materials. I used the process of generating an architectural deepfake to better understand two precedent houses while creating a thoughtfully crafted and wholistic architectural composition. In the future, I look forward to seeing how deepfake generation can be applied to other artistic realms, such as song and dance, showing that we could learn to understand our world at a finer, more distilled level.

Bibliography

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